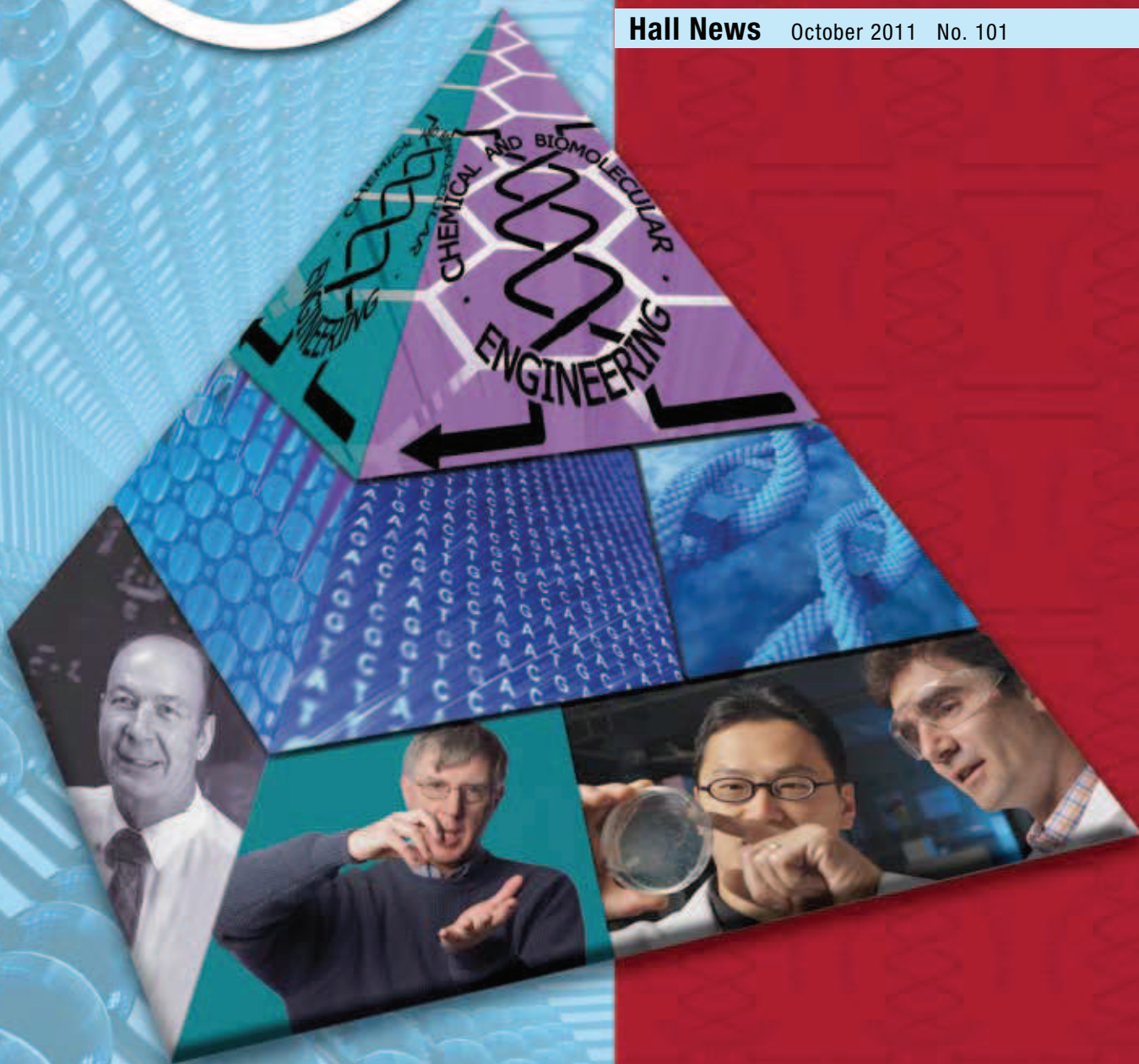


School of Chemical and Biomolecular Engineering

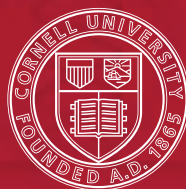


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Hall News October 2011 No. 101



Pushing the Frontier of Biomolecular Engineering  
Modernizing the Unit Operations Laboratory  
Walters: Using ChemE to Solve Complex Medical Problems  
Alumni in Academic Careers



Cornell University



# Walters: Dr. House Using ChemE to Solve Complex Medical Problems

Volunteering as a Red Cross candy striper at age 14 first inspired Cheryl Ashville Walters '77 to become a physician. She fulfilled her dream – and then some. An internist, she has served on the clinical faculty of Weill Cornell Medical College, Columbia University College of Physicians and Surgeons, and Yale University School of Medicine and is a fellow of the Berkeley College of Yale University, a fellow of the New York Academy of Medicine and a member of the New York Academy of Sciences.

Dr. Walters has been recognized by the U.S. Department of Education, American College of Physicians, American Association of Medical Colleges and Society of General Internal Medicine as an expert in the assessment and teaching of clinical skills and in program development and assessment. She developed a model program for the assessment and teaching of clinical skills which has been widely disseminated to medical, pharmacy, nursing, and law schools.

Before entering University of Rochester School of Medicine on a full scholarship and going on for residency at Massachusetts General Hospital/Harvard Medical School and The New York Hospital/Weill Cornell Medical College and clinical fellowship in advanced diagnostic skills at The New York Hospital/Weill Cornell Medical College, she earned her Cornell bachelor's degree in chemical engineering. A Cornell National Scholar and advisee of Professor Ray Thorpe, Dr. Walters credits her chemical and bioengineering training with focusing on concepts, problem solving, and critical reasoning. Along with senior design teammates Maggi Freese and Richard Martinez, she developed a deep appreciation for the value of working with a team, dealing with diagnostic uncertainty, developing a feel for the magnitude of a reasonable answer, and applying reiterative approaches to arrive at the best-fit solution – skills that helped form the foundation of her expertise in making difficult diagnoses.

## On the Job, Diagnosing Tough Cases

In her clinical practice, Dr. Walters is dedicated to assessing and improving the parity and quality of care for the underserved. She is an attending physician at Yale New Haven Hospital and professor of clinical medicine at Yale University School of Medicine. For seven years running, she received the top score across every specialty in the Art of Medicine survey of patients of the Yale University Health Services in recognition of her bedside manner and her reputation for making difficult diagnoses which had previously been missed. She has directed the Physical Exam Training Program (her syllabus and other resources on her study of the error patterns of students on the physical exam are available at <http://www.cawalters.com>) and established the Clinical Skills Assessment Program at Yale University School of Medicine.

Dr. Walters was also asked to create the ACES (Advanced Clinical Exam Sessions) clinic in the Primary Care Center at Yale New Haven Hospital. She was the supervising attending physician for each of the Yale Internal Medicine interns as they rotated through seeing walk-in patients with an array of acute chief complaints. The clinic was designed to teach the interns how to gather the key historical and physical findings to guide testing and arrive at a differential diagnosis. ■

## Giving Back:

*In memory of her father and in deep appreciation for the generous scholarship support and training from Cornell which helped to launch her career, Dr. Walters recently established a named scholarship, the Noah A. Walters, Jr. Graduate Scholarship. Her gift will support professional and graduate students in perpetuity in the College of Veterinary Medicine.*



Dr. Walters with first year Yale medical student Jessica Crawford examining another medical student in the Physical Exam Training Program at Yale University School of Medicine.

## A Clinical Vignette: The Case of the Pale Albino

One example of the challenges that Dr. Walters regularly faces with her advanced diagnostic team is the case of a 32-year-old woman with Albinism and associated Hermansky Pudlak Syndrome. The Syndrome is caused by a rare autosomal recessive inherited error of metabolism leading to decreased pigmentation, platelet dysfunction and bleeding problems, and storage of abnormal fat-protein debris in organs. In severe cases, fatal pulmonary fibrosis, cardiomyopathy, granulomatous colitis or renal disease may be seen. The patient complained of three months of shortness of breath progressively worsening from exertional to persistent at rest. Pertinent positive history clues included suspected oil furnace malfunction in her apartment, heavy menstrual flow, and family history of a sister who died in her twenties from pulmonary complications of the Syndrome. Pertinent negatives included no history of cough, wheeze, chest pain, paroxysmal nocturnal dyspnea, leg swelling, increasing abdominal girth, polyuria, oliguria, diarrhea, constipation, obstipation, trauma, surgery, travel, prolonged immobilization, joint swelling, rash, fever, smoking, medications, or toxic exposures in her job as a seamstress.

The team explored a long list of conditions that might be aligned with her problems. Her physical exam was remarkable only for a rapid pulse, ashen hair, gray pupils, and pallor of her conjunctivae, skin, oral mucous membranes and palms. Normal pulse oximetry and STAT arterial blood gas results eliminated hypoventilation or respiratory failure. STAT electrolytes, blood urea nitrogen and creatinine ruled out renal failure.

The team postulated three different critical, potentially fatal, diagnoses: carbon monoxide poisoning from the faulty furnace, or the rapidly progressive pulmonary fibrosis or cardiomyopathy of Hermansky Pudlak Syndrome. Accordingly, they ordered additional tests: blood carboxy hemoglobin level; chest X-rays and pulmonary function tests with diffusion capacity; electrocardiogram and echocardiogram. In addition, social workers were dispatched to ascertain the safety of the apartment.

The differential included one common diagnosis: iron deficiency anemia in a young menstruating female with heavy flow, possibly exacerbated by platelet dysfunction. Lab results confirmed a normal platelet count, slightly prolonged bleeding time, hemoglobin level less than half the normal value and near zero iron saturation – information that helped to clinch their diagnosis. To the medical team's relief, other test results were all unremarkable, and the patient's apartment was also deemed safe. At this point, they felt fairly certain they could rule out other medical issues.

They chose a conservative treatment: high dose oral iron supplements with vitamin C to optimize absorption. Dr. Walters brought in consultants from the Yale Gynecology and Hematology clinics to assist in further evaluation and to provide ongoing follow-up.

At her follow-up appointment three weeks later, the patient was asymptomatic – she had no shortness of breath at all! On physical exam, her pulse and other vital signs were normal. Most remarkable, though, was her appearance – her pallor was gone, and she was now a healthier pink. The thoroughness and thoughtfulness with which Dr. Walters' team pursued every clue brought the young woman back to health.